

**PRINCE GEORGE COUNTY  
VIRGINIA RURAL BROADBAND PLANNING INITIATIVE  
PHASE I REPORT**

**CCG CONSULTING, LLC**

**NOVEMBER 27, 2007**

## **I. SUMMARY**

The County engaged CCG Consulting, LLC. (CCG) to study issues associated with broadband availability within the County. This Phase 1 report look at the results of the research done by CCG. Phase 1 of the study concentrated on needs assessment to determine if there was a broadband gap in the County. Phase 1 also looked at the need in the County for broadband training.

CCG staff looked at broadband demand in the County using several methods. First, CCG performed a statistically significant sampling of residences that asked a number of questions about the availability of broadband and about how residents use broadband. This survey demonstrated a significant broadband gap. Only 44% of County residents have purchased broadband access today, significantly below the national average of 55% of households. Around 35% of County households still use dial-up access, far in excess of the nationwide average of around 15% of households. In talking to residents CCG determined that a significant portion of the broadband gap is due to the lack of broadband availability. In geographic terms, a large portion of the County still has no broadband availability from the telephone or cable company. A map of showing the approximate availability of broadband today is included below as Attachment 2. A large percentage (66%) of the customers with dial-up expressed a desire to get broadband. The reason most households don't have broadband is because of lack of availability rather than cost.

The County does not have a large business community. There are approximately 430 businesses in the County, mostly concentrated in the northern portion of the County and further concentrated along a few major roads. A map of the business community is included as Attachment 1 below. The vast majority of the businesses are service and retail businesses that do not generally require as much broadband as manufacturing and other businesses that employ a lot of people. There are a few medium businesses that are significant employers in the County that are concentrated in the northern portion of the County. Economic development is a key issue for the County and businesses believe that broadband is now one of the essential infrastructure elements needed to get and keep businesses in the County. Last year there was an announcement by the federal government that Fort Lee will be significantly expanded due to base realignment and a significant number of new military jobs will be coming to the base and to the County. The County also expects that this expansion of the base will attract new businesses associated with Fort Lee. The County staff fears that without adequate broadband, these new businesses will instead relocate to nearby communities.

Because there are so few businesses in the County it was impractical to obtain a valid sample of businesses through a survey. In order to achieve the same level of confidence obtained with the residential survey it would be necessary to talk to nearly half of the 430 businesses in the County. CCG's experience in other similar studies showed that most businesses are reluctant to participate in these types of surveys. Since CCG felt that the business response to a survey would not be sufficient to be meaningful, CCG instead elicited the County staff's help in seeking volunteer companies to give a more in-depth interview. The County talked to nearly 20% of the business in the County in order to get 18 volunteer interviews, which is not untypical for these kinds of studies. The volunteer businesses were highly informed about broadband issues in the

County. They understood the availability (or lack of availability) of broadband products and they understood prices. Almost universally they said that they know many other businesses similar to themselves. These volunteer businesses were all unhappy with broadband in the County. Some still could not get broadband and are still using dial-up. Others felt they were paying too much for the broadband they could get.

The primary issue for businesses is broadband availability. A large number of businesses can still only get dial-up access. Until very recently, the County Business Park still had dial-up access with no DSL. However, even businesses with DSL felt like they did not have enough bandwidth. This is typical of circumstances across the country. The business world is increasingly dependent upon web access. Businesses buy and sell on the web, do all of their research on the web and communicate with customers and suppliers on the web. Having adequate broadband access has become essential for most businesses to function efficiently.

The County has a broadband gap between residents and business that still have dial-up access and those who can get cable modem or DSL. Cable modem and DSL service is approximately 20 to 30 times faster than dial-up access. Dial-up access can get speeds up to 56 kbps at maximum performance. In many places where the copper cable is older, dial-up speeds are slower. The typical DSL service delivers around 1,000 to 1,500 kbps, a significant speed improvement over dial-up. Cable modem service typically delivers a little more speed than DSL, generally with speeds of 2,000 to 2,500 kbps. Today there are many functions in the Internet that will not function with dial-up access, so a home or businesses stuck with dial-up cannot enjoy many of the benefits of the Internet. Even when dial-up can reach the Internet, the response times are incredibly slow.

If a business can't get DSL they have one other broadband option. Such businesses can almost always buy a broadband service referred to as a T1 or a DS1. This is a broadband service that delivers 1,544 kbps. However, where business DSL costs around \$100 per month, a T1 for Internet access in the County costs around \$700 per month. Businesses using T1s are very unhappy with the price. Note that DSL is not always an adequate surrogate for a T1. T1s are symmetrical service, meaning they have the same speed for upload and download. DSL has about the same download speed as a T1, but a much faster upload speed. To many businesses upload speeds are just as important as download speeds.

While the County has a significant broadband gap today, the gap is about to get much wider. Verizon is very actively building a network that delivers fiber to homes and business. Verizon markets this new technology and product line under the product name of FiOS. FiOS delivers a significant amount of bandwidth to homes and businesses. Generally FiOS is 20 to 30 times faster than DSL, which is 20 to 30 times faster than dialup. Thus, broadband over Verizon FiOS is 400 to 900 times faster than dial-up. Verizon is building FiOS at a furious pace. They have already passed several million homes and are expected to pass another million homes in the coming year. Generally FiOS is priced a little higher than DSL but delivers a lot more bandwidth. Current residential products on FiOS deliver 10,000 to 30,000 kbps today and businesses can get up to 100,000 kbps. Verizon is expected to increase these speeds over the coming years.

The broadband gap is going to widen because places like Prince George County don't have enough population mass to be a likely target for Verizon to build FiOS in the foreseeable future. Verizon still has to get to many places that are much larger than the County. Parts of Richmond already have FiOS and most of it is expected to have it in the next few years. Based upon the areas where Verizon is building FiOS, CCG speculates that Petersburg will also have FiOS much sooner than the County. The County is rural enough that much, or even all of the County might never get FiOS, depending upon Verizon's business plan. As the areas around the County get FiOS, the broadband gap in the County will become even more significant. Where businesses in the County today often cannot get any broadband, they will be at a severe economic disadvantage when businesses in nearby counties will have access to broadband that is 500 times more cost effective and efficient.

In summary, the County today has one of the largest broadband gaps that CCG has encountered across the country, and this gap is quickly widening due to the availability of fiber-to-the-home in nearby communities. Today the County has one of the largest percentages of customers still stuck with dial-up. In the near future the County will have the same mix of dial-up and DSL sitting next to areas that have fiber connectivity. This next-generation broadband gap is going to have a significant effect on the County. One would expect housing prices to drop over time in those areas with dial-up access. One would expect business to locate in neighboring communities instead of Prince George and one might also see an outflux of businesses that are already in the County.

### Estimating Broadband Demand

Phase 2 of this study will be looking at the economic feasibility of the County providing the infrastructure that can help close the broadband gap. While the Phase 2 study has not been completed, the following general statements about the expected demand for a County-sponsored network can be made as a result of the Phase 1 work:

1. Any network solution is going to have to be paid for by bringing broadband to residential users. There are a significant number of residential households with no broadband alternative and a significant number of households with DSL who say they would switch to another broadband source, given a choice. Any network will only work financially by serving residential customers. There are not enough businesses in the County to justify a business-only network solution.
2. Since economic development and jobs was perhaps a main driver behind the County doing this study, and since the County has placed a priority on recruiting businesses to the new Industrial Park, then getting adequate broadband for the Industrial Park must be a priority. If the County must make a choice between serving the Industrial Park or serving the smaller and scattered smaller businesses, they should choose the Industrial Park. There is the opportunity in the near future for significant growth in the Industrial Park due to the expansion of Fort Lee. The influx of soldiers and functions at the Fort ought to bring along new businesses associated with the Fort, and these will be the kind of businesses that expect real broadband. Until very recently the only broadband available in the Industrial Park was T1s, which are very expensive, and which still only deliver a

modest amount of bandwidth. Very recently Verizon has brought DSL to the Industrial Park. While DSL is significantly cheaper than T1s, DSL delivers around the same download speeds as T1s but with slower upload speeds. Only a fiber network is going to bring the kind of bandwidth that the Industrial Park really needs.

3. CCG can estimate the number of residential customers that might be interested in a County broadband network. Here are some basic facts from the residential survey:

- 35% of the residences still have dial-up access, and 66% of those say they would buy broadband if it was available.
- 38% of the households with no Internet said they would consider buying broadband from a County network.
- 40% of the households with DSL or cable modem are dissatisfied with the speeds they get for the price they pay.

CCG staff can translate these survey results into a projected residential market penetration. Today there are roughly 11,000 households in the County. These can be segregated into internet usage today as follows:

Uses DSL or cable modem	44%	4,840 households
Uses dial-up	35%	3,850 households
No Internet connection	22%	2,420 households

Using the above statistics the following potential broadband demand for a County network should exist:

Those with Broadband who would switch (40%)	1,936 households
Those with Dial-up who would switch (66%)	2,541 households
Those without Internet who would buy (38%)	<u>920</u> households
Total Potential Residential Demand	5,397 households
(equals 49% total potential subscribers)	

This result is about the same as the percentage of residences who said they would buy Internet access from a County broadband network (48%). Please note that in addition to those who said they would buy from the County that another 19% of homes said they might buy from the County. Thus, the 49% expected penetration rate is conservative.

4. While there is not enough statistical data to estimate business penetration rates, one would suppose it would be as high as the residential rates. However, there are not enough businesses in the County such that businesses can have a very significant impact on a broadband business plan. Put another way, the revenues from adding 200 businesses to such a network would not have a significant impact on the profitability of such a network.

## Training

CCG's investigation into training uncovered a few facts. First, there are no significant existing computer training courses in the County. The libraries and schools offer occasional ad hoc

courses, but there are no regular and systematic training courses available physically in the County. There are a lot of training opportunities in Richmond and other nearby places.

The residential survey showed that people are very interested in training courses and they say they would take them if available locally.

A final issue is that there are not a lot of venues in the County to hold training courses.

Thus, the challenge for the County, should they wish to promote training, is to find a way to connect the trainers (who are readily available in Richmond), with a venue in the County and then get the word out to citizens. The original RFP assumed that CCG would suggest trainers who could bring training to the County, but until somebody figures out where to hold training courses and how to get the word out to citizens about these courses, it is premature to talk about specific trainers. Please note that there are a significant number of companies and individuals in Richmond who do computer training, so finding the trainers should be easy once somebody figures out where to hold training sessions. The County Broadband Task Force has undertaken the training issue and is looking for local venues and at partnerships with the library system and the Board of Education.

## **II. NEEDS ASSESSMENT**

This section of the report looks at the results of the research done by CCG. Specifically, this section covers the residential surveys, the interviews with businesses and the existing infrastructure.

### **A. Residential Surveys**

CCG conducted a residential survey of a statistically valid sample of residents of Prince George County. In this survey residents were asked questions concerning Internet usage and computer training. A full copy of the survey questions and the results are included as Attachment 3.

The first step in developing the survey was to determine how many residents must be surveyed for the results to be considered statistically valid. There are several on-line tools that are accurate in determining the right sample size - ([www.surveysystem.com/sscalc.htm#terminology](http://www.surveysystem.com/sscalc.htm#terminology)) and (<http://calculators.stat.ucla.edu/>). The first site is from the web site for Creative Research Systems, a firm specializing in market research. The second site is from the Statistics Department at UCLA. For both websites the sample size provided by the website has always been the same or nearly the same (sometimes varied by 1 because of rounding) as the results obtained by manual calculation.

Another important factor in designing a survey is to determine the desired level of confidence wanted from the results. From consultation with staff, a sample size was selected that would produce results with a 95% confidence level. In layman's terms this

means that the results obtained would be roughly within 5% of the results that would be obtained if CCG talked to every resident in the County. A 95% confidence level is the same that is used for most commercial and political surveys. Choosing the confidence level allowed the determination of the sample size. There are currently around 11,000 households in the County. In the 2000 Census there was 10,159 households and the growth rate estimated by the Census would predict around 11,000 households currently. In order to obtain the statistically valid results at the desired confidence, a sample size of 378 completed residential surveys was needed.

CCG determined who to call using a systematic sampling approach. CCG started with the white page telephone listings for the County and then called every twenty-fifth resident. If staff was unable to get an answer they continued with the next household after the one missed. This type of methodology isn't strictly random, but is the approach that almost all telephone surveyors use, and it is a valid sampling technique. Since the callers didn't know anybody in the County, this method achieves the same results as using a pure random calling pattern. Since telephone numbers tend to be geographically situated in parts of the County, choosing every twenty-fifth resident gave the best opportunity to reach all geographic parts of the County.

The survey produced some interesting results. For a full copy of the survey and answers see Attachment 3. Here are highlighted survey results by the different sections of the survey:

#### Data (High Speed Internet Access)

44% of residences currently have high-speed Internet access, comprised of 25% who use cable modem, 15% who use DSL and 4% who use satellite. Another 35% of customers still use dial-up. Only 22% of customers have no Internet access at home.

The County is trailing the national average of high-speed connections, which ranges between 50% and 55% (depending upon which nationwide survey is referenced). There are far more than average dialup customers in the County at 35%, compared to the national average of between 18% and 20%. In the rest of the country the number of dial-up customers is declining rapidly, but lack of broadband alternatives leaves many customers in Prince George with no alternative to dial-up.

62% of the households without Internet access (or 12% of all households) said they have no interest in the Internet. The remainder of those without Internet access cited cost or other reasons for not having Internet.

66% of customers with dial-up said they would like to change to a high-speed connection. However, many of them don't have an affordable high-speed alternative available today.

61% of residents use the Internet for leisure. 43% use the Internet for school. 25% use the Internet for work.

70% of residential internet connections cost less than \$30 per month. This result is skewed somewhat due to the high number of people still on dial-up.

Residents were basically satisfied with the customer service provided by their current Internet service providers. Only 3% were dissatisfied with customer service. Only 9% were dissatisfied with getting problems fixed.

However, many more customers were dissatisfied with the speed of the Internet connections. 40% of residents were dissatisfied with both the download and upload speeds of their connection.

Only 23% of households believe the market is bringing Internet service that people can afford. 55% of households thought that Internet was becoming as essential as a utility. Only 21% said that people wouldn't be able to enjoy a high quality of life without high-speed Internet access.

A gigantic 81% of residents said that the County should take a role in bringing high-speed Internet access to students, while 65% thought the County should take a role in bringing inexpensive Internet access to all households. 51% thought the County ought to take a role in bringing high-speed Internet access to businesses.

48% of households said they would buy Internet access from the County if it were offered at a discount compared to today's prices. Another 19% said they might buy from the County. These two results equal 83% of those with Internet access today.

11% of households reported that somebody works from home.

Staff asked how people generally feel about the existing utilities in the County (and with the County). The following percentages of households either liked or completely trusted each of the following:

Comcast	61%
Verizon	80%
Dominion Virginia Power	83%
Prince George Electric Cooperative	85%
The County	80%

Overall, the survey shows several things. First, the County is trailing the national average in terms of people with high-speed Internet connections (and as a corollary still has a significant number of people using a dial-up connection). Households are dissatisfied with the speeds of the Internet products they are

offered. 83% of customers with Internet access today said they would consider buying Internet from the county for a faster and/or cheaper connection.

### Computer Training

Survey responders were asked some questions about computer training.

39% said they would like more computer training.

Only 13% have taken a computer training course while living in the County.

67% said they would like the County to take a role in getting more computer training in the area.

55% said they would take a computer training course if it was locally available and affordable. Another 13% said they might take courses.

## **B. Business Interviews**

The County does not have a large business community. There are approximately 430 businesses in the County, mostly concentrated in the northern portion of the County and further concentrated along the few major roads. A map of the business community is included below as Attachment 1. The vast majority of the businesses are service and retail businesses that do not generally require as much broadband as manufacturing and other businesses that employ a lot of people.

The County will soon adopt a long-term Comprehensive Plan concentrating businesses and residential development in specific areas of the County. The County actively recruits new businesses and business relocations to the Crosspointe Centre Industrial Park. Last year there was an announcement by the federal government that Fort Lee will be significantly expended due to base realignment and a significant number of new military jobs will be coming to the base and to the County. The County also expects that this expansion will attract new businesses associated with Fort Lee. The County fears that without adequate broadband, these new businesses will instead relocate to nearby communities.

Because there are so few businesses in the County it was impractical to obtain a valid sample of businesses through a survey. In order to achieve the same level of confidence obtained with the residential survey it would be necessary to talk to nearly half of the 430 businesses in the County. CCG's experience in other similar studies showed that most businesses are reluctant to participate in these types of surveys. Since staff felt that the business response to a survey would not be sufficient to be meaningful, CCG instead elicited the County's help in seeking volunteer companies to give a more in-depth interview. The County talked to nearly 20% of the business in the County in order to get 18 interviews, which is not untypical for these kinds of studies. The volunteer businesses were highly informed about broadband issues in the County. They understood the

availability (or lack of availability) of broadband products and they understood prices. Almost universally they said that they know many other businesses similar to themselves.

The volunteer businesses were highly informed about broadband issues in the County. They understood the availability (or lack of availability) of broadband products and they understood prices. Almost universally they said that they know many other businesses similar to themselves. The volunteer businesses were all unhappy with broadband in the County. Some still could not get broadband and are still used dial-up. Others felt they were paying too much for the broadband they could get.

The primary goal of these interviews was to generate discussion on the general experiences of businesses with broadband or the lack thereof in the County. Staff addressed questions in the following areas in discussions with the businesses:

- Availability of Services and Opinion of Providers
  - The overall experience and satisfaction with existing broadband providers.
  - Detailed broadband services that are purchased today, what would be purchased today if there were no broadband barriers, and what might be purchased in the future.
  - Prices and affordability.
  - The availability to businesses of every service that they want and need today.
  - Addressed the awareness of competition in broadband today and if they knew how to look for broadband alternatives.
- Service Criteria
  - Factors they considered most important with regard to broadband services, primarily reliability, price and customer service.
- Service Issues and Problems
  - Opinion of current providers' customer service.
- Role of Government
  - Opinion of the government's role in providing broadband, and if so, what sort of role.

Following is a summary of the responses and issues uncovered in the course of the business interviews:

- **Availability of Services and Opinion of Providers.** First, the businesses in the County were very aware of broadband (or the lack of it). They understood the available products and the prices. Many of the businesses can only get dial-up service or else they know a number of other businesses who can still only get dial-up. All the businesses were aware of the limited broadband options in the County and every business had put in an effort to determine if any alternatives were available to them. Not one of the businesses said that they were satisfied with their current provider or type of service available, and all stated that they would consider alternatives, especially if they could get more speed at a lower price. As you would expect, dial-up customers would like any type of broadband. Cable modem customers would like to have redundancy with DSL (they generally complained that cable modems often went

Businesses with broadband access are getting services from three different providers, including Verizon, the telephone company and Comcast, the cable company. The third provider that offers broadband services to some businesses is PAETEC, a Competitive Local Exchange Carrier (CLEC). PAETEC resells Verizon's T1 service and doesn't have any facilities in the County. Another option in the county is satellite, which is provided by HughesNet. While CCG didn't interview any business that uses satellite, one would expect that there are at least a few businesses that use HughesNet. Most of the businesses interviewed use Verizon DSL or T1s.

A few businesses were using Comcast cable modem service, but others complained about the Comcast connection policy. Apparently, if a business is not directly situated on an existing cable line then Comcast charges a high fee to connect a business to the cable network. Many businesses said the high Comcast hookup fee was a barrier for them to get connected.

Following are some of the issues raised during the business interviews:

- a. Lack of broadband availability is the biggest concern to all businesses. Even businesses with broadband were concerned that so many other businesses didn't have it. They thought that was bad for business in general.
- b. Businesses that have broadband are aware of neighboring businesses that do not have broadband available to them. They were often amazed at the apparent borders for broadband availability since they all knew of businesses with broadband right next to businesses that could not get broadband.
- c. Some businesses only have dial-up Internet for Internet access and they were very unhappy with this situation.
- d. Some businesses wanted more than one option for redundancy.
- e. Businesses felt that T-1 prices are too high and quoted prices for Internet T-1s from \$600 to \$700 per month, for 1.5 Mbps connectivity.
- f. Most businesses said that they would want faster speed if it were available.
- g. Small businesses can't afford a T-1. They would like very high bandwidth at a reasonable price.
- h. One home business was satisfied with cable modem service. However, when they recently purchased a new home they had to forego their first several housing choices since many homes did not have high-speed Internet connectivity. Many residential areas are without broadband service, which is a concern to business owners who want to do business from home.
- i. 100% of the businesses interviewed said that they wish the County could provide alternatives to what is currently available.

- **Service Criteria.** All of the businesses interviewed said that the lack of choice for broadband was their biggest issue. Reliability and price was a secondary factor. The following are representative comments from businesses:
  - a. One business is using two different providers for redundancy. They have a T-1 and DSL.
  - b. Many businesses expressed a need for redundancy.
  - c. Availability is the biggest issue for all businesses.
  - d. Every business interviewed would consider using the County's service.
- **Service Issues and Problems.** The business customers reported significant problems with installation of their current services. Additionally, many had a poor opinion of their providers' customer service. Comments were primarily directed at Verizon, but this may have been because Verizon served most of the business interviewed. Following are some representative comments from businesses concerning service:
  - a. It took three months to install a T-1
  - b. One business had to wait 45 days before they got phone service from Verizon at their new location. They had to file a complaint with the Virginia Public Service Commission to get their phones connected.
  - c. Most said that they did not like to deal with Verizon.
  - d. Businesses found customer service difficult because they can never talk to the same person twice.
  - e. They would like local customer service.
- **Role of Government.** All respondents were encouraged that the County was studying broadband alternatives and said they would support the County getting involved in the broadband business. All said that they would consider the County or another alternate provider's service offerings. Following are representative comments from businesses concerning the role of government:
  - a. All businesses are happy that the County is serious about providing broadband alternatives.
  - b. They would be much more comfortable with a local service provider.
  - c. Availability, price, reliability and type of service are their main concerns.
  - d. They generally thought that the government ought to step in since private providers have not stepped up.
  - e. Businesses have commended the County for recognizing the importance of the issue.
  - f. Businesses thought that the County needs to educate the public about the broadband issue.

Overall these business interviews showed some common theme across the spectrum of businesses. First, businesses are concerned about broadband availability in the county. Reliability and cost were their next concern. Basically all of the business were not happy with the incumbent providers and said they would try an alternative.

The interviews also showed a business community that has a clear understanding of the marketplace. Businesses were very aware of the broadband issues in the County and were

aware of the products and prices available to them. Generally the businesses seemed to have the mindset that something needs to be done now in the County.

The reactions received were not typical. CCG has performed similar interviews all over the country and two things stood out in Prince George. First, businesses here are very aware of the broadband situation, which is unusual. Secondly, all the volunteer businesses were unhappy with the incumbent products and ready to try something different. CCG has interviewed business communities where a few businesses were unhappy, but never one where everybody was unhappy with the status quo.

## **C. Geographic Availability of Broadband**

The County staff has prepared a map showing the areas they believe have DSL coverage by Verizon today and cable modem coverage by Comcast. This map is following the report as Attachment 2.

This map shows that broadband coverage is concentrated in the northern portion of the County. This map shows that there are large geographic portions of the County with no broadband.

It is important to know that coverage shown on this map is the best guess of the County staff. There are certainly a number of customers within the colored areas that do not have broadband availability.

For example, Verizon DSL availability is shown on the map by drawing a three mile circle around existing Verizon DSL service points. That is a decent representation of the way that DSL works, but not entirely accurate. DSL is roughly available to homes and businesses that are within 18,000 cable feet of a Verizon DSL service location. Cable feet means the distance that the DSL signal travels on cables as they run up and down streets, and not in a straight line. There might be customers within three miles of a Verizon office that are more than 18,000 cable feet away and not able to get DSL. There are also other issues that affect DSL availability. Sometimes there are issues with the copper wiring on a street or the copper wiring within a home that affect DSL performance and availability. Thus, a home could be within the 18,000 cable feet and still be able to get DSL if there is a problem with their outside or inside wiring. Finally, DSL does not work over fiber. If a home has any fiber in the network between the DSL service point and the home, then DSL does not function.

There are similar issues with cable modem service from Comcast. Comcast will have a formula for the County for determining where they will or will not build the cable network. Such a requirement might be set by the franchise agreement, otherwise it is a Comcast policy decision. For example, Comcast may not build cable wiring to any street where there is not at least 15 homes in a street mile. In such a case, a street with only a few homes may not have cable service even if they are within the colored areas of the map. Conversely, a customer can pay for the wiring to their house to be added to the Comcast network, so there might be a few customers connected to the cable system that

are outside the areas shown on the map. The charges for this sort of connections are high, but sometimes neighbors band together to get onto the cable network.

#### **D. Broadband Education in the County**

CCG's residential surveys showed that citizens desire and would take advantage of computer training courses if they were available. 55% of respondents stated that they would take a computer training course if it was locally available and affordable. 67% of respondents said they would like the County to take a role in getting more computer training courses in the county. Based on these responses and using the premise that citizens and businesses will obtain greater benefit from courses that are easily accessible, staff limited the review to programs and providers located within the County. There appears to be a large number of trainers and options available in nearby communities like Richmond and Petersburg.

In addition to the residential interviews staff interviewed the schools, libraries, community colleges and businesses to learn about training issues. CCG found that only minimal current programs are available within the County that would meet the diverse needs of both residents and businesses. These consist of:

- Courses through the Appomattox Regional Library System (ARLS).
  - Adult computer classes are offered routinely at ARLS libraries located in Prince George County. These classes typically address the basics of computer training and are targeted to residential users, with the July/August class schedule including classes such as "Make Friends with the Computer", "Computers for Beginners", "Microsoft Word Basics", "Blogs & Other Social Sites", "Microsoft Excel Basics" and "PowerPoint Basics".
- Courses through the Community College Workforce Alliance (CCWA)
  - The Community College Workforce Alliance is a joint effort between John Tyler Community College and J. Sargeant Reynolds Community College. While these entities do not have campuses in Prince George County they do offer online open enrollment fee-based courses in computer applications, use of the internet and advanced computer topics. The majority of the online courses require a multi-week commitment.
- Commercial entities or consultants offer computer training either through enrollment or customer-specific engagements, at a cost to the user. Staff did not find any specific cases of commercial entities offering classes within the County, but did find that there are a number of these types of providers in neighboring counties. Businesses said that they generally sent employees out of the County for computer training or used on-line training.
- Numerous courses are available online through the Internet, which could be utilized by residents and businesses in the County. Of course, this requires some knowledge of computer use in order to access this type of training, and the majority of these types of courses are offered at medium to high fees. On-line courses also typically require broadband access.

Educating the community and building a demand for broadband would require easily accessible courses of short duration at differing levels of experience. Courses targeted to specific audiences are especially important. For example, seniors will require a different educational approach than teenagers. Basic computer classes need to address how to use computers, including how to upgrade them and what types of security measures are available, applications available with broadband, and use of different types of software. More advanced courses should be made available for more experienced users and businesses would often require customized courses targeted to their specific needs.

### **Specific Recommendations for Computer Training**

The residential surveys showed an unfulfilled need for computer training in the County. What steps can the County take to make it easier for people to get training?

- Perhaps the biggest issue for computer training is where to hold courses. There is no readily available venue to house such training in the County. Probably the first step for the County would be to find and secure agreements of places that would agree to house such courses. This could be the schools, the libraries, the County complex or some other place. Once a venue was established, it will be easy to find trainers who seem to be in abundance in Richmond. The County Broadband Task Force has undertaken this issue and is working with groups in the County to identify places where broadband training courses could be offered.
- Another valuable role for the County might be to actively publicize the availability of courses and providers, through dissemination of written information in public venues such as the libraries and public schools; inclusion of information on the county's web site and public outreach through civic, community and business organizations.
- The County could also work with the libraries and with the Community College Workforce to expand the offerings in basic computer courses, at no cost to users. Perhaps the results of the residential survey can show that more training is needed.
- Finally, the County could take a direct role in setting up training courses. The County could seek private training companies to come teach specific courses in the County. A number of such trainers are available in Richmond. Trainers could be sought who would be willing to offer courses that are not available elsewhere, of short duration, and preferably at low to no cost. The best way to find the right trainers would be by issuing a Request For Proposal to find strategic partners who would be able to offer the desired training.

### **D. Existing Infrastructure**

CCG was tasked with identifying the existing infrastructure in the County that might be useful if the County were to move forward with a broadband initiative. At this point the

research in this area is not completed, but staff can report on a preliminary basis what has been found. There will be meetings with County and other government officials later in September to dig deeper into the specifics of the infrastructure. This report will be amended as more detail is found in the course of engineering a possible broadband solution.

Results so far:

- The County recently constructed a wireless network for public safety. In constructing this network the City built two monopole towers (large single poles that can hold an antenna). The public safety network consists of the two County monopoles plus five sites where the County leases space on other existing towers. CCG engineers will be investigating the availability and suitability of the County's monopole towers for use in a broadband network.
- There seems to be a number of existing public towers used for cellular and other wireless services that are available for lease.
- The County owns a small amount of fiber that connects the buildings at the County campus.
- VDOT operates traffic lights, and thus there are no County facilities used for this purpose.
- The buildings in the County campus seem to have enough space for the creation of a network hub if that is needed. The fact that all of the County's buildings are clustered gives you an advantage over many other Counties.
- CCG will be reporting on the incumbent providers in Phase 2 of the report.

### **III. CONCLUSION**

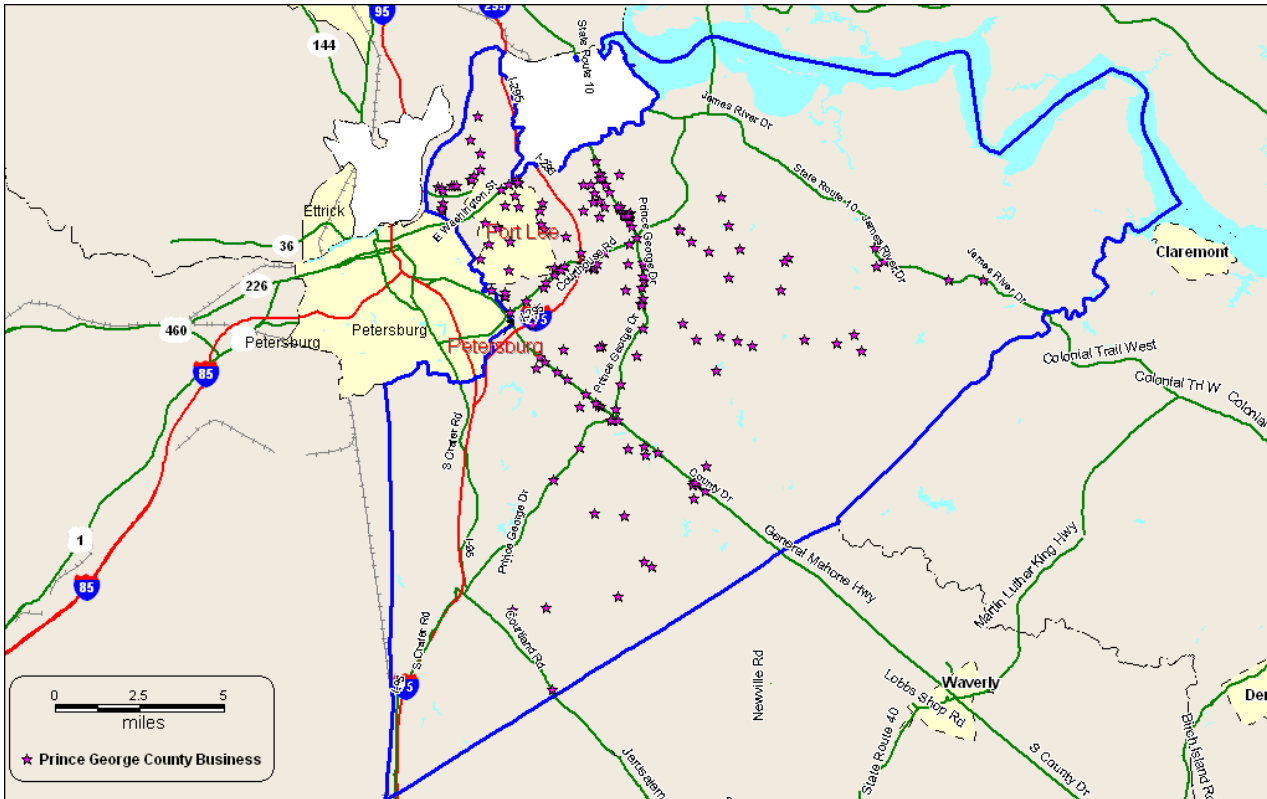
The County engaged CCG Consulting, LLC. (CCG) to study issues associated with broadband. The Phase 1 work was associated with needs assessment to determine if there is a broadband gap in the County and to try to quantify the broadband gap.

The CCG conclusion is that the County has a serious broadband gap. There is a significant number of households that are still using dial-up service and who can't broadband service. It also seems unlikely that the commercial broadband providers, Verizon and Comcast, will be filling the broadband gap and bringing broadband to these parts of the County.

CCG's recommendation is to proceed with the Phase 2 study to determine if there is a solution that will bring broadband to the parts of the County without it today.

# Attachment 1

## Prince George County Businesses

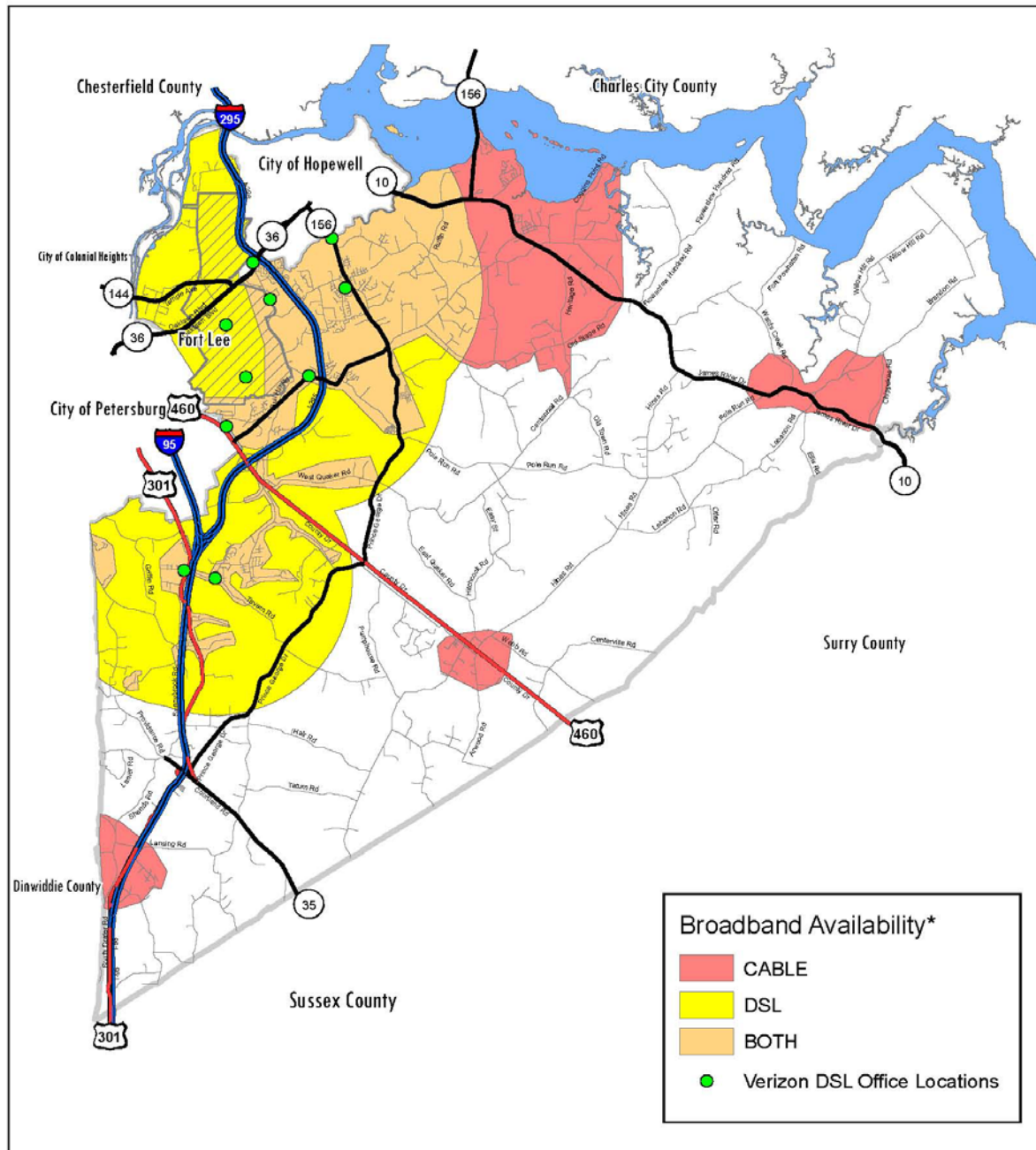


There are around 430 businesses in the County. Note that on the map that in some cases the stars represent more than one businesses when businesses are located near to each other.

## Attachment 2

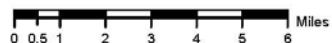
### Broadband Availability in the County

#### County of Prince George Broadband Internet Service Availability



\*DSL Service Area based on 18,000' distance from Verizon DSL Office Locations

Cable Internet Service Area based on generalized Cable TV service areas.



## Attachment 3

### Prince George County, VA Residential Survey Results

#### Total Residential Surveys - 378

#### High Speed Internet

1. What type of internet service do you have?

	<u>Number</u>	<u>Percent</u>
Cable Modem	93	25%
High speed DSL	56	15%
Satellite	14	4%
Dial-up	133	35%
Don't Have Internet	82	22%

2. If no Internet, why don't you have service?

	<u>Number</u>	<u>Percent</u>
Not interested/don't need	46	62%
Uses it at work/school	12	16%
Internet is expensive	10	13%
Does not own computer	3	5%
Considering it	1	1%
Dial-up is too slow	1	1%
Need computer training	1	1%
Will get it soon	1	1%

3. If you use dial-up Internet access today, have you considered changing to high-speed Internet access?

	<u>Number</u>	<u>Percent</u>
Yes	88	66%
No	44	33%
Maybe	1	1%

4. Is the Internet service in your house used primarily for?

	<u>Number</u>	<u>Percent</u>
All of the above	76	20%
Leisure	114	30%
Leisure & work	6	2%
Other	7	2%
School work	6	2%
School work & leisure	18	5%
School work & education	37	10%
School work, education, other	4	1%

School & work	3	1%
School work, education, leisure	17	4%
Working from home	9	2%
Did not answer question	81	21%

5. How much do you pay for Internet service each month?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
\$20 or less	117	40%
\$21 - \$30	90	30%
\$31 - \$40	37	13%
\$41 - \$50	23	8%
\$51 to \$60	3	1%
More than \$60	3	1%
Don't know	23	7%

6. Please rate your Internet service provider regarding the following from 1 to 5, where one is 'extremely dissatisfied' and five is 'extremely satisfied'

Courtesy and Friendliness of Staff

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Extremely Dissatisfied	4	1%
2 – Somewhat Dissatisfied	5	2%
3 – It's OK	52	18%
4 – Somewhat Satisfied	81	27%
5 – Extremely Satisfied	143	48%
Don't know	11	4%

Amount of time it takes to get problems fixed

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Extremely Dissatisfied	8	3%
2 – Somewhat Dissatisfied	17	6%
3 – It's OK	57	19%
4 – Somewhat Satisfied	90	30%
5 – Extremely Satisfied	105	35%
Don't know	19	6%

Download Speed

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Extremely Dissatisfied	84	28%
2 – Somewhat Dissatisfied	36	12%
3 – It's OK	23	8%
4 – Somewhat Satisfied	38	13%
5 – Extremely Satisfied	115	39%
Don't know	0	0%

#### Upload Speed

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Extremely Dissatisfied	84	28%
2 – Somewhat Dissatisfied	36	12%
3 – It's OK	24	8%
4 – Somewhat Satisfied	38	13%
5 – Extremely Satisfied	114	39%
Don't know	0	0%

#### The value I get compared to the price I pay

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Extremely Dissatisfied	28	9%
2 – Somewhat Dissatisfied	29	10%
3 – It's OK	80	27%
4 – Somewhat Satisfied	81	27%
5 – Extremely Satisfied	71	24%
Don't know	7	2%

7. Please indicate if you agree or disagree with the following statements where one is 'strongly disagree' and five is 'strongly agree'

The competitive marketplace currently offers high-speed Internet at prices that everyone can afford.

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Strongly Disagree	90	24%
2 – Disagree	57	15%
3 – Might be True	106	28%
4 – Agree	37	10%
5 – Strongly Agree	50	13%
Don't know	29	8%
Did not answer	9	2%

High-speed Internet is (or will soon be) as essential as water, sewer and electricity.

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Strongly Disagree	61	16%
2 – Disagree	21	6%
3 – Might be True	83	22%
4 – Agree	78	21%
5 – Strongly Agree	127	34%
Don't know	8	2%

In the near future most people won't be able to enjoy a high quality of life unless they have high-speed Internet access.

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Strongly Disagree	188	50%
2 – Disagree	38	10%
3 – Might be True	67	18%
4 – Agree	41	11%
5 – Strongly Agree	39	10%
Don't know	4	1%
Did not answer	1	0%

The County should take a role to insure that all students have access to low cost Internet access for educational purposes.

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Strongly Disagree	19	5%
2 – Disagree	19	5%
3 – Might be True	32	8%
4 – Agree	55	15%
5 – Strongly Agree	248	66%
Don't know	5	1%

The County should take a role to insure that all households have access to low cost Internet.

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Strongly Disagree	34	9%
2 – Disagree	26	7%
3 – Might be True	65	17%
4 – Agree	65	17%
5 – Strongly Agree	183	48%
Don't know	5	1%

The County should take a role to insure that all small and medium businesses have access to low cost Internet access.

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Strongly Disagree	69	18%
2 – Disagree	34	9%
3 – Might be True	71	19%
4 – Agree	52	14%
5 – Strongly Agree	140	37%
Don't know	12	3%

8. Would you buy high-speed Internet from the County?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
Yes	183	48%
No	122	32%
Maybe	72	19%
Don't know	1	0%

9. Do any of the adults in your household work from home?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
Yes	43	11%
No	331	88%
Maybe	3	1%
Don't know	1	0%

10. Please give your overall perception from 1 to 5 (1 being 'don't like' and 5 being 'completely trust and like') on how much you like and trust the following :

Comcast

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Don't Like at All	20	5%
2 – Don't Trust a Lot	12	3%
3 – Neutral	64	17%
4 – Like	103	27%
5 – Completely Trust	130	34%
Don't know	31	8%
Did not answer question	2	1%
N/A	16	4%

Verizon

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Don't Like at All	5	1%
2 – Don't Trust a Lot	11	3%
3 – Neutral	42	11%
4 – Like	117	31%
5 – Completely Trust	186	49%
Don't know	5	1%
Did not answer question	10	3%
N/A	2	1%

Dominion Virginia Power

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Don't Like at All	10	4%
2 – Don't Trust a Lot	3	1%
3 – Neutral	22	9%
4 – Like	93	38%
5 – Completely Trust	110	45%
Did not answer question	4	2%

Prince George Electric Cooperative

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Don't Like at All	5	2%
2 – Don't Trust a Lot	3	1%
3 – Neutral	24	10%
4 – Like	54	24%
5 – Completely Trust	139	61%
Don't know	1	0%
Did not answer	3	1%

County

	<b><u>Number</u></b>	<b><u>Percent</u></b>
1 – Don't Like at All	5	1%
2 – Don't Trust a Lot	11	3%
3 – Neutral	45	12%
4 – Like	111	29%
5 – Completely Trust	194	51%
Don't know	5	1%
Did not answer	7	2%

**Computer Training**

11. Do you feel you could use more training on the computer?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
Yes	148	39%
No	213	56%
Maybe	17	4%

12. What kind of training would be most useful?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
Any/All of the above	2	3%
General	131	35%
None	2	1%
Other	1	0%
Programming	72	19%
Programs (Spreadsheets, Word Processing, etc.)	45	12%
Did not answer	110	29%
Don't know	8	2%

13. Have you ever taken a computer training course while living in the county? If so, what kind?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
Yes (programming, programs, school, work related, general usage)	51	13%
No	312	83%
Maybe	1	0%
Did not answer	14	4%

14. Would you like the County to take a role in getting more computer training courses in the county?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
Yes	255	67%
No	61	16%
Maybe	47	12%
Don't know	15	4%

15. Would you take a computer training course if it was locally available and affordable?

	<b><u>Number</u></b>	<b><u>Percent</u></b>
Yes	209	55%
No	107	28%
Maybe	50	13%
Don't know	12	3%

## Attachment 4

### How People Use Real Broadband

If the County is going to promote computer training, it's important to understand how people use computers today and how this might change if there is more broadband. This section details how people use real broadband in communities that have found ways to deliver broadband. Many of these activities require bandwidth greater than DSL.

Below is a discussion of the benefits of broadband and the ways that people use broadband, when available. The benefits described below have been categorized and described as County services, health care, leisure, and community connections. Additional equipment or development of content may be necessary to achieve some of these benefits, which would need to be addressed in the County's strategic or business plans. Business applications would have to be addressed by specific businesses. However, many of these applications can be made available by stakeholders and interest groups working together to establish and maintain the applications. The County's role would be to promote and advertise these efforts in the same manner as described above for promotion of computer training, and working to ensure that appropriate training courses are offered by providers that would educate the community concerning establishment and operation of these types of initiatives.

The overall benefits of high-speed connections are described well in *Life Saving Technology*:<sup>1</sup>

*Industry veterans say national broadband access will only lead to major changes in U.S. society if connection speeds get exponentially faster than those typical of cable and DSL today. Otherwise, the most likely result will simply be better use of existing technologies, such as those for e-mail, Web surfing and music downloading.*

#### County Services

County services can be improved if the County and its citizens are connected to high-speed access. Electronic government or "e-government" can help the County achieve efficiencies in internal applications and relationships with citizens, businesses and other governmental bodies. While some of the applications that are possible can be achieved with low bandwidths, especially for individual users, high bandwidth connections enhance the experience and encourage participation. High bandwidth connections are required for more sophisticated applications.

In 2002, the *Quello Center Report*<sup>2</sup> examined the benefits that might be either enabled or enhanced by access to broadband services in the areas of Communities and Society,

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<sup>1</sup> Borland, John & Hu, Jim. (2004). Broadband: A life-saving technology. CNET News.com. Online, [http://news.com.com/Broadband+A+life-saving+technology/2009-1034\\_3-5261361.html](http://news.com.com/Broadband+A+life-saving+technology/2009-1034_3-5261361.html). (*Life Saving Technology*)

Telemedicine, E-Learning, E-Government, E-Business, Telecommuting. and Media and Entertainment. Applications discussed in the Quello Center Report include:

- General information publication, search and retrieval on the Internet;
- Transactions with citizens (ticket payment, bill payment, permit application, filling of licenses, online crime reporting, online citizens complaints, street light repair requests, online voting);
- Multimedia applications (Webcasting, 3D navigation, high definition video, IP telephony);
- Transactions with businesses (Government e-procurement, Government & Business collaboration);
- Inter-government information sharing and transactions, video conferencing; and
- Internal efficiency and efficacy (Intra-government information publication and sharing, internal daily operations).

Following are some of the benefits described in the *Quello Center Report*<sup>3</sup>:

- E-government makes it easier for citizens to access high-quality government services. The potential benefits include providing government services to citizens 24-hours-a-day, 7-days-a-week, delivering government services from any place, and guaranteeing rapid response to citizen needs.
- E-Government can also improve efficiency in key service areas, such as regulation, economic development, trade, permits/licenses, grants/loans, and asset management. E-government could provide better services for business and non-profit organizations simplify agencies' business processes and reduce costs by integrating and eliminating redundant systems.
- E-government makes it easier for governments at different locations and levels to share and integrate information. Consequently, government will be able to improve the performance of intergovernmental activities. In addition, E-Government can improve coordination across the local, state and federal levels of government. E-government can also eliminate delays in processing, improve employee satisfaction and retention, reduce costs, and improve the quality of federal government agency administration.
- There is evidence that E-government enhances administration and improves internal communications. According to a survey conducted by the E-Government Task Force, 75% of the government officials surveyed reported that E-government had already enhanced their internal administration, and 80% said that their own agency has done an excellent or a good job of using the Internet to improve the efficiency and quality of service.
- E-government can reduce the size of the government and save costs. Government agencies can provide E-government services to the public with smaller staffs than would be required to provide the services through in-person contacts, thereby

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<sup>2</sup> Bauer, Johannes M., Gai, Ping, Kim, Junghyun, Muth, Thomas A., & Wildman, Steven S. (2002) Broadband: Benefits and Policy Challenges, A Quello Center Report. The James H. and Mary B. Quello Center for Telecommunication Management and Law, Michigan State University, East Lansing, MI. <http://quello.msu.edu/reports/broadband-report-final.pdf>. (*Quello Center Report*)

<sup>3</sup> References are excluded from quotes.

reducing personnel costs. Also by allowing the public to enter information on-line as opposed to filling out a paper form, government organizations can reduce operating costs associated with producing, distributing, and handling the forms.

Richard Somerset-Ward examined how community networks are being used in his July 2005 report, “Broadband Community Networks: Building The Digital Commons”<sup>4</sup>. He maintains that there should be more focus on content development:

*In particular, government and community agencies need to set the technologists to work to develop ways in which social services can usefully and economically make use of broadband distribution....Can welfare-to-work (again, the educational elements) be better achieved via broadband? Can employment opportunities, job retraining, services for senior citizens, and hundreds of other services for all parts of the population be efficiently (and humanely) delivered over broadband to people in their homes or at some convenient gathering point?*

### Health Care

Access to broadband networks can benefit both health care providers and consumers. These benefits can include improved quality of services, reductions in cost, dissemination of health information to the public, reduced time in hospitals and more efficient administration.

The *Quello Center Report*<sup>5</sup> states that “distance from specialized service providers becomes a less important factor in determining quality of care. Patients living in the distant regions from hospitals could benefit from the e-health system as well.”, and that “Broadband can improve training for healthcare professionals by providing high quality multimedia information for clinical and educational support.”<sup>6</sup> Examples are included in *Life Saving Technology*:<sup>7</sup>

*Dr. Bruce Dunn of Clement J. Zablocki Veterans Administration hospital in Milwaukee was one of the first doctors in the country to create a “telepathology” practice serving a hospital 200 miles away. Through a broadband connection, his computer receives video images from a remote-controlled microscope in a sister hospital in Iron Mountain, Wisconsin, which he uses to diagnose cancers and other diseases in tissue samples.*

*Many more doctors exchange large data files such as x-ray results, which do not require real-time connections but still need high-speed networks. Hospitals have found broadband technologies to be invaluable in non-life-threatening situations*

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<sup>4</sup> Somerset-Ward, Richard. (July, 2005) Broadband Community Networks: Building The Digital Commons. A Report For The Haas Charitable Trusts. Philadelphia, PA.

<sup>5</sup> *Quello Center Report*, Page 12.

<sup>6</sup> *Quello Center Report*, Page 12.

<sup>7</sup> *Life Saving Technology*

*as well, saving considerable labor and other resources by using it to handle medical claims, insurance processing and other administrative tasks.*

With regard to cost savings, the *Quello Center Report*<sup>8</sup> maintains that “By reducing delay times to consult patients and to search for data they want with stable and fast broadband connections, doctors could become more time efficient in their diagnosis. With more time efficiency, hospitals or other medical institutions could earn more revenues.”

The availability of health information to the public can also benefit the community and reduce costs of health care. As explained further in the *Quello Center Report*:<sup>9</sup>

*Easy access to health or medical information on the Internet can reduce the need for and frequency of visits to doctors and hospitals because some types of information can be delivered effectively through websites. Web-based images enhance the effectiveness of the Internet in this educational role. Access to medical information might also assist patients by providing guidance on assessment of symptoms and how to monitor vital signs.*

The necessity and length of hospital stays can be reduced with enhanced homecare. “Remote monitoring, diagnosis and consultation can in many cases enable patients to receive treatment at home and avoid the expense and inconvenience of hospital stays.”<sup>10</sup> A widely quoted study by Robert E. Litan estimated the economic benefits from the use of broadband technologies for Americans who are over 65, or who have disabilities. In the study, Dr. Litan estimated that the net present value of total benefits for this sub-group will be \$927 billion in 2005 dollars over the next 25 years. These benefits include “lower medical costs; delay of institutionalized living; and additional output generated by more seniors and individuals with disabilities in the labor force.”<sup>11</sup>

Dr. Litan maintains that broadband technologies will benefit the elderly and disabled through cost savings in medical care, as follows:<sup>12</sup>

*The cost savings arise because broadband will facilitate the widespread usage of disease management programs that require constant or “real-time” communication between patients and providers of medical care in a way that would be much less convenient or even impossible in a “dial-up” world (for example, through remote monitoring by health care providers and by two-way communications between patients and health care providers, or “telemedicine”).*

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<sup>8</sup> *Quello Center Report*, Page 12.

<sup>9</sup> *Quello Center Report*, Page 13.

<sup>10</sup> *Quello Center Report*, Page 13.

<sup>11</sup> Litan, Robert E. (2006). “Broadband for Seniors and Disabled”. Broadband Properties. Online, <http://www.broadbandproperties.com/2006issues/feb06issues/Litan%20-%20Health%20and%20Medicine.pdf>. (*Broadband For Seniors*).

<sup>12</sup> *Broadband For Seniors*.

*Medical monitoring enabled by broadband should also delay (or conceivably eliminate the need for) institutionalized living for some seniors and individuals with disabilities....The VA's integrated chronic disease monitoring program has produced impressive cost savings, cutting hospital admissions by up to 60 percent.*

Health care providers can also help to limit errors and achieve efficiencies to improve the quality of their services. As Dr. Litan explains:<sup>13</sup>

*...still do not take full advantage of information technology to digitize record-keeping, invoicing, prescription ordering, and other functions. There is no generally available system of portable, easily used patient medical records so that patients need not fill out new sets of forms, including their medical histories, each time they visit a new health care provider."*

*Savings could be realized through widespread online access to patients' electronic medical records; clinical decision support and payer guidelines; prescription and ordering of medical tests; real-time verification of reimbursement eligibility; appointments scheduling and referrals; patient education and interaction (including "email appointments" rather than in-person visits); compliance monitoring; and greater use of the Web for ordering supplies...*

## E-Learning

Citizen's educational opportunities can be enhanced both in the local school system and through greater access to E-learning models. Distance learning programs may be an enhancement to the educational environment in the schools, but will also provide for continuing education and opportunities for all ages. As pointed out in High-Speed Learning<sup>14</sup>, "The greatest and most profound effect of broadband on the learning process, however, could come from equal and affordable access not just to schools, but homes as well."

One important aspect concerning both use of the system and opportunities for learning was addressed in *Lessons From Blacksburg Virginia*<sup>15</sup>. The Blacksburg Electronic Village (BEV) had its official start in 1993. By 1997 studies showed that more than 80% of Blacksburg residents were using the Internet routinely. This was not a broadband network, but a community network that originally relied on high-speed modems for access.

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<sup>13</sup> *Broadband For Seniors.*

<sup>14</sup> Fulton, Katherine. (2006). "High-Speed Learning: How Broadband Is Changing The Educational Landscape". *LastMile*. March, 2006. [www.lastmileonline.com/previous-issues/3-06\\_coverstory.htm](http://www.lastmileonline.com/previous-issues/3-06_coverstory.htm). (*High Speed Learning*)

<sup>15</sup> Cohill, Andrew Michael. *Community Networks: Lessons From Blacksburg, Virginia*. Boston, MA, Artech House, Inc., 1999. Page 336. (*Lessons From Blacksburg Virginia*).

*What Blacksburg quickly found was that community education was a necessity if they wished to attract users. "The "field of dreams" model has been a stumbling block for many of the communities we have worked with - people change habits slowly, and a key role for the community network effort is to help people become comfortable with making changes in the way they communicate."*

Both businesses and residential users had difficulty envisioning the ways they could use, and benefit from, the Blacksburg network. Blacksburg began offering classes to businesses, located in university computer labs, and quickly had to set rules concerning attendance because local companies wanted to send numerous employees. The BEV states that "the majority of the citizens of Blacksburg can now be regarded as computer- and network literate."<sup>16</sup>

*High-Speed Learning* emphasizes why diverse educational opportunities are so important<sup>17</sup>:

*While there are some who advocate a "back to basics" approach to education and curriculum, it is becoming increasingly obvious that the United States must prepare its students for the rigors of global politics, economics and communications by providing them with the knowledge and perspectives needed to thrive in a complex world. And as districts, educators and governments seek ways to make all of this possible, one word stays at the forefront of the discussion: Broadband.*

Affordable broadband access allows schools to bring a global perspective to students. As described in *Virginia Super Fast Networks*:<sup>18</sup>

*Louis Fox, director of the Internet2 K20 Initiative, said, "Internet2 has been providing advanced networking for the nation's K-20 community for many years and has been successful in bringing advanced educational programs to Virginia. Through the use of Internet2's advanced networks, students across the state have been able to participate in cutting-edge experiences like Megaconference Jr., a project that uses advanced videoconferencing technology to bring together thousands of students in elementary and secondary schools from around the world for an all-day learning conference."*

*"Also, students can receive live undersea exploration demonstrations from remote locations with famed oceanographer Bob Ballard, take master music classes from world-renowned instructors or use remote-controlled instruments to dissect a biology specimen from 1,000 miles away," Fox said. "Leveraging Internet2 technology and our vast network of resources and partners throughout the world,*

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<sup>16</sup> *ibid*, Page 30.

<sup>17</sup> *ibid*

<sup>18</sup> Trulove, Susan. (2006) "Virginia universities, colleges connect K12 schools to super fast networks" Blacksburg, Virginia. Virginia Tech News. (*Virginia Super Fast Networks*)

*the opportunities are endless for students to expand their educational and cultural horizons.”*

*Broadband Networks*<sup>19</sup> outlines benefits to public schools that have been achieved with The Digital California Project, a statewide initiative:

The State’s investment in establishing a high speed, broadband network for K-12 education represents a critical piece of the infrastructure necessary for teachers and learners to keep pace with the “anytime, anywhere” universe of information services emerging in the private sector. This infrastructure lays the groundwork for:

- Synchronous (real time) and asynchronous (on demand) interaction and collaboration across distances, enhancing access to professional development workshops, degree and certification programs, virtual tours, field trips, special events, etc.
- Networking can help address the demand for more teacher professional development at a time when funds are being reduced. Video conferencing and Web-casts, both of which require significant network bandwidth, can improve access while reducing travel and training costs.
- Greater use of data, text, graphics, voice, and video to supplement textbooks and instruction with multimedia formats that tap into the many different learning styles of students and teachers.
- The ability to model or simulate “what-if” scenarios to help students understand difficult concepts.
- On-line delivery of instruction by highly qualified teachers for courses where the number of students is too small or a teacher is not available.
- Training students in the use of technology through integration with academic instruction in a meaningful way enhances learning and ensures that students have the skills necessary to be successful in today’s knowledge-based workforce.
- Resource sharing and cost savings through joint licensing to leverage resources for maximum benefit.
- Administrative applications and efficiencies.
- Delivery of student support services to help with course selection, college placement, and entrance exam information, as well as career and vocational counseling.
- Student data management to transfer voluminous student information.

Similar opportunities and benefits for the educational community were identified by a group in the United Kingdom in “Opportunities and Barriers To The Use of Broadband in Education”:<sup>20</sup>

- Enhance the learning experience

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<sup>19</sup> Corporation for Education Network Initiatives in California (CENIC). (2003). *Broadband Networks In K-12 Public Education; Achieving Last Mile Connectivity to California Schools*. Online [www.cenic.org/pubs/reports/lastmilejune03.pdf](http://www.cenic.org/pubs/reports/lastmilejune03.pdf). (*Broadband Networks*)

<sup>20</sup> Broadband Stakeholder Group, *Opportunities and Barriers To The Use of Broadband in Education*. (2003). Online, [www.broadbanduk.org/reports/BSG\\_%20Education\\_%20Report\\_03.pdf](http://www.broadbanduk.org/reports/BSG_%20Education_%20Report_03.pdf).

- Broadband can transform the learning experience for students as it can expose them to a range of exciting and innovative learning content that was previously either inaccessible or unpractical in the narrowband environment. Exposure to new forms of content can have a positive motivational effect and encourage students to want to learn.
- Improve cooperation between educational institutions
  - One of the real benefits of broadband is that it can facilitate and enhance inter-institutional collaboration. For example, broadband can be used to share scarce teacher resources between schools and colleges via high-speed interactive videoconferencing (previously not practical in a narrowband environment), it can also be used to link different institutions to create innovative joint projects that encourage communication and cooperation. In one innovative project, broadband was used to facilitate the often difficult transition for students when they move from primary to secondary schools.
- Deliver new potentialities
  - Broadband can also facilitate new and innovative e-learning opportunities on a wider scale. For example, broadband has been used to enhance modern language learning through conversational language lessons with native speakers in other countries such as in the Ashcombe case study. It has also been utilized in the Nesta Motivate project to provide school students with access to mathematics experts. On a wider scale, it can also facilitate international collaboration with organizations and institutions outside the education sector as an innovative project involving the Birmingham Ballet has demonstrated.
- Improve efficiencies in existing educational provision
  - Broadband can deliver real efficiencies in existing provision by streamlining reporting and administration as well as automating the administration and management of educational institutions (see the Cambridgeshire schools example below). Broadband can also be used to deliver curriculum details and examination results to students in a more efficient way.
- Widen access to education
  - Broadband can also be exploited to widen access to educational material and new learning opportunities by using links from schools to the wider communities, such as libraries, museums, theatres and other cultural institutions as is happening in the Bethnal Green Museum of Childhood.
  - Broadband is also used as a means of widening access in rural areas and providing access to education materials to learners with disabilities or behavioral problems such as in the Notschool.net project identified below.

## Leisure

Broadband connections can enhance leisure time for the community. Not only will high-speed service provide access to tools to plan and manage leisure time, it will also allow for more participation in games and faster downloading of music or films, and it can expand the availability of cultural resources. The *Quello Report*<sup>21</sup> lists the following media and entertainment benefits:

- Improved audio and video quality
- Music swapping
- Digital movies
- Online gaming
- Digital television

Entertainment is currently the focus of applications that will be utilized with broadband. Sir Howard Stringer, Chairman and CEO of Sony Corporation of America shared his vision in 2004:<sup>22</sup>

*For the first time device and content companies can form direct and highly personal relationships with the consumer. Because for the first time devices will connect directly to the broadband internet, transforming business models.*

*...broadband convergence will do more than make some companies rich. It will also unleash social and cultural energies that are difficult to predict and just as hard to control. It will provide local artists with the means to distribute their visions to a global audience. It will allow individual communities the means to pick and choose which influences – local and global – they embrace. And it will give millions of people around the globe an outlet both to create and to appreciate what others create.*

The potential for the entertainment industry was also described in *Killer App*:<sup>23</sup>

*...it is broadband to the home that will allow the consumer to download the content they want to watch on these soon-to-become ubiquitous video devices, or simply to watch it on their schedule rather than one dictated by others.*

*Once global releases are occurring, the majority of viewers may be in homes watching movies they have downloaded, playing electronic games based on the movies, often in Internet-enabled groups spanning the globe, and communicating with others about their experiences. Movie-based games are profit-making enterprises for these same studios.*

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<sup>21</sup> *Quello Center Report*, Page 32.

<sup>22</sup> Stringer, Sir Howard, Chairman and CEO, Sony Corporation of America. (2004). “The Broadband Entertainment Planet”, Financial Times New Media and Broadcasting Conference, London.

<sup>23</sup> Entertainment: The Broadband Killer App: A FirstMile.US Perspective. (2006). firstmile.us. (*Killer App*)

## Community Connections

In 1994, Stephen Bajjaly addressed the general benefits to the community in *Community Networking*:<sup>24</sup>

*Most importantly, a community network can reignite a spirit of cooperation and belonging that we thought was lost forever. The network provides a way to unite the efforts of school districts, libraries, local government, and other agencies to support public access to information and reinforce a stronger sense of community. Further, the network can build upon the efforts of local information providers already online and help new information providers to get online.*

As explained previously, Blacksburg, Virginia implemented a community network very early. *Lessons From Blacksburg Virginia*<sup>25</sup> found that “One important reason to use tax dollars or other broad funding bases for a community network is because it appears that ties among groups and individuals in the existing community are strengthened.”, and that:

*Computer networks such as the Internet allow interaction among groups of people. As such, they have the potential in geographic communities of supporting and extending social relationships. The quality of life in a community with dense social networks, high levels of trust, and norms of mutual reciprocity, what Robert Putnam (1995) calls its "social capital," is higher than the quality of life in communities with low social capital.*<sup>26</sup>

One instance of the benefits to the community as illustrated in *Lessons From Blacksburg Virginia* is:<sup>27</sup>

*Joe, an elderly man in Blacksburg, suffered a fall three winters ago and broke his hip. Joe had to remain in bed for almost two months while his hip healed, but he still spent a lot of time with his friends. Joe is a member of the Blacksburg Electronic Village (BEV) Seniors group, which represents one of the most cohesive segments of the community in terms of online activities. With his personal computer at his bedside, Joe stayed in daily contact with his friends by using the BEV seniors mailing list to keep up with group discussions and e-mail to maintain personal contact with friends and neighbors.... The daily contact and the rich communications potential of electronically written letters kept Joe occupied and alert throughout his convalescence and allowed a group of busy*

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<sup>24</sup> Bajjaly, Stephen T. (1999) *The Community Networking Handbook*. Chicago, ALA Editions of the American Library Association. Page 6. (*Community Networking*)

<sup>25</sup> *Lessons From Blacksburg Virginia*, Pages 79.

<sup>26</sup> *Lessons From Blacksburg Virginia*, Pages 87.

<sup>27</sup> *Lessons From Blacksburg Virginia*, Pages 1 and 2.

*friends to support him in a way that would not have been possible without Joe's connection to the internet.*

Community networks also provide opportunities for enhanced participation in local organizations.<sup>28</sup>

*Online communication, particularly through Web sites and group discussion forums such as listservs, are excellent strategies for organizations to extend their missions, develop new partnerships, and expand existing relationships. By offering a package of online services to existing community organizations and groups, a community network can stimulate communication and strengthen social networks.... Users report that convenient access to timely information and updates has been a major improvement over traditional communication mechanisms such as telephone trees.*

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<sup>28</sup> *Lessons From Blacksburg Virginia*, Page 30.